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(54) **CENTRE DE COMMANDE INFORMATISE
(54) INFORMATION CONTROL CENTER (ICC)**

(57)

The present invention provides tools that collect and analyze total company energy and facility information. Using the generated information, the present invention diagnoses, recommends, and implements timely solutions to help manage facility energy requirements. An information command center system provides energy management and includes real-time monitoring and control monitoring energy in real-time and for controlling at least one of generation and dispatch of the energy; Internet-enabled communications providing communication between the information command center and at least one of users, energy distributors and energy generators via the Internet; a plurality of multi-channel, real-time network of sensors monitoring the energy from at least one of the energy generators and the energy distributors; and real-time pricing determining pricing of the energy in substantially real-time. The information command center also includes demand forecasting generating an energy demand forecast; real-time equipment dispatch dispatching of site generation resources and implementation of load management strategies; direct links an energy commodity trading desk for at least one of purchasing and selling the energy responsive to the energy management; load shedding and management removing at least a portion of a load responsive to the energy management; and weather normalization determining weather related conditions and potential adverse effects to the energy management.



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(57) Abrégé/Abstract:

The present invention provides tools that collect and analyze total company energy and facility information. Using the generated information, the present invention diagnoses, recommends, and implements timely solutions to help manage facility energy requirements. An information command center system provides energy management and includes real-time monitoring and control monitoring energy in real-time and for controlling at least one of generation and dispatch of the energy; Internet-enabled communications providing communication between the information command center and at least one of users, energy distributors and energy generators via the Internet; a plurality of multi-channel, real-time network of sensors monitoring the energy from at least one of the energy generators and the energy distributors; and real-time pricing determining pricing of the energy in substantially real-time. The information command center also includes demand forecasting generating an energy demand forecast; real-time equipment dispatch dispatching of site generation resources and implementation of load management strategies; direct links an energy commodity trading desk for at least one of purchasing and selling the energy responsive to the energy management; load shedding and management removing at least a portion of a load responsive to the energy management; and weather normalization determining weather related conditions and potential adverse effects to the energy management.

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ABSTRACT

The present invention provides tools that collect and analyze total company energy and facility information. Using the generated information, the present invention diagnoses, recommends, and implements timely solutions to help manage facility energy requirements. An information command center system provides energy management and includes real-time monitoring and control monitoring energy in real-time and for controlling at least one of generation and dispatch of the energy; Internet-enabled communications providing communication between the information command center and at least one of users, energy distributors and energy generators via the Internet; a plurality of multi-channel, real-time network of sensors monitoring the energy from at least one of the energy generators and the energy distributors; and real-time pricing determining pricing of the energy in substantially real-time. The information command center also includes demand forecasting generating an energy demand forecast; real-time equipment dispatch dispatching of site generation resources and implementation of load management strategies; direct links an energy commodity trading desk for at least one of purchasing and selling the energy responsive to the energy management; load shedding and management removing at least a portion of a load responsive to the energy management; and weather normalization determining weather related conditions and potential adverse effects to the energy management.

Invention Summary

Applying its state-of-the-art integrated information platform and metering technology, the present invention provides tools that collect and analyze total company energy and facility information. Using the generated information, the present invention diagnoses, recommends, and implements timely solutions to help manage facility energy requirements.

The present invention includes a complete range of energy and facility management tools:

Retriever Module:

- Automated energy consumption data retrieval, archiving, and posting
- Load data posting
- Load analysis and comparison
- Cost estimation based on tariff
- News, weather, and technology links
- Standard personalized branding of web site

Energy Analysis Module:

- Load aggregation
- Peak load analysis with trending and benchmarking tools
- Cost estimation ("what-if" analysis)
- Utility bill posting per existing tariff(s)
- Automated notification with alarming and paging

Power Quality Module:

- Data monitoring, event capture, and archiving
- Web access to power quality information in various formats
- Access to 24/7 Information Command Center
- Personalized alarm triggering via pager, e-mail, cellular phone, or personal data assistant (PDA)
- Harmonic analysis

Load Management Marketplace Module:

- Automated posting of local and regional pricing
- Benchmark load certification
- Verification of load curtailment and payment amount
- Bid notification and acceptance/rejection from supplier/ISO
- Economic value calculation of load curtailment
- Customer election to participate

Distributed Generation Dispatch Module:

- Automated generator operation or load-shedding initiative
- Verification of power generated and notification of curtailable event
- Viewable data from any combination of assets
- Real-time monitoring and alarming of all asset parameters.
- Calculation of participation level and savings.

The present invention includes one or more of the following benefits:

- Fast, secure access to information
- Ability to differentiate loads/costs between buildings and/or equipment
- Real-time access to system performance and control of energy assets
- Enterprisewide access to information
- 24/7 alarming and emergency response
- Energy cost control
- Increased reliability of equipment and systems
- Reduced maintenance hours
- Integration with existing equipment
- Early warning of problems
- Complete Scalability
- Enhancement of existing building automation and control systems
- State-of-the-art Information Command Center

The following specific areas of the present invention are further described herein:

Power Quality Functionality/Process

The present invention evaluates power quality to assess the operation of equipment and determining maintenance or repair needs. The evaluation consists of any or all of the following steps:

Design Analysis

- Review facility and load performance objectives.
- Identify locations where known deficiencies exist.
- Identify pending renovations, expansions, or upgrades

Load Analysis

- Monitor voltage and load variations at service entrance.
- Measure distribution panel capacity.
- Measure incoming currents and voltages.

Vulnerability Assessment

- Inspect wiring and grounding.
- Check for improper or missing neutral/ground connections.
- Verify wiring and grounding practices.

Verify transformer configurations, grounding, and ratings.

Measure grounding system impedance.

Verify grounding practices of communication cabling.

Infrared Thermographic Inspection

Perform infrared scan of all accessible electrical panels, transformers, switchgear, and automatic transfer switches

Document equipment and locations showing abnormal heating and recommend corrective action.

Harmonic Analysis

Document facility harmonic voltage and current levels.

Surge Suppression Assessment

Verify surge suppressor installation practices.

Verify surge protective device energy ratings.

Uninterruptible Power Supply (UPS) Assessment

Preparation and Submittal of Report (including observations and recommendations for corrective action)

The present invention provides the following benefits for power quality functionality: methodology; increased system reliability; evaluation of power distribution system equipment according to all applicable industry standards; efficient and effective project coordination, requiring minimal customer time; reduction of system emergencies and costly downtime; availability of follow-up system repair and replacement services.

Retriever Module

The present invention provides information that enables a user to understand energy consumption data and helps formulate optimal strategies for energy procurement and use. By capturing energy data from metering devices, the present invention continuously updates information on facilities' energy consumption at the frequency selectable by the user. The present invention delivers this critical information via Internet- or network-based tools to make strategic, informed decisions that will increase system reliability and efficiency. The present invention provides the following features: automated retrieval of energy consumption data, archived in a data warehouse and posted to secure web pages; clear and understandable load data in various tabular and graphical formats; tools to analyze and compare energy load across time and facilities; accurate cost estimation based on existing tariffs.

The present invention provides the following benefits for the retriever module: optimize energy consumption decisions with actionable data; enable your internal energy management staff to make informed decisions; view and analyze your energy use for any single site or facility grouping you choose; gain information to shop for market-priced electricity on an hourly basis; nominate or change contracted natural gas quantities to gain optimal pricing; and calculate your estimated utility bill for any time period or billing cycle you select.

Energy Analysis Module

The present invention provides tools that will facilitate development of procurement and usage strategies. Building on information gathered by the Retriever module, the Energy Analysis Module generates signals that will assist in actually implementing an energy management strategy. The present invention includes the features of load aggregation; peak load analysis; trending and benchmarking; cost estimation ("what-if" analysis); utility bill posting per existing tariff(s); and automated alarming and paging based on software algorithms.

The present invention provides the following benefits: analyze energy power and load with electronic metering devices; manage energy usage patterns with effective visualization and historical trending tools; reduce future energy purchase costs by tracking usage over time; identify largest facility energy consumers by normalizing demand and usage data by a key variable; track the contribution of each facility and business line to overall consumption; generate utility bills for budgetary purposes and to verify accuracy; evaluate energy costs using alternative tariffs; and receive notification of current consumption behavior outside normal parameters.

Power Quality Module

The present invention provides an integrated approach to help minimize disruptions using the best metering technology and information. The Power Quality Module captures facility electrical disturbances that fall outside of industry-specified tolerance specifications established by the Computer and Business Equipment Manufacturers' Association CBEMA). This information, combined with monitoring and event notification, characterizes the integrity of the voltage and current waveforms at a specific point in the electrical power distribution system, permitting the assessment of its suitability for the reliable operation of connected equipment.

The present invention includes the features of: data monitoring, recording, and archiving; event capture; posting of power quality information on customized web site (tabular and graphical); access to 24x7 Information Command Center; alarm triggering (according to prespecified criteria); alarm notification via pager, e-mail, cellular phone, or personal data assistant (PDA); waveform capture; and harmonic analysis.

The present invention provides the benefits of: receive immediate notification of operating problems within sensitive electronic equipment; capture and analyze alarm trends to avoid unplanned shutdowns of vulnerable equipment; reduce downtime costs; accurately pinpoint electrical events not previously possible after the fact; evaluate auxiliary systems to ensure exceptional performance levels; and optimize operations with a single point of contact for system performance.

Load Management Marketplace Module

Once the user has the ability to manage your facility energy load actively, the Load Management Marketplace Module enables the user to capitalize on the volatility of the energy supply market. The ability to make smart business decisions regarding operating costs will increase as idle assets are turned into revenue generating opportunities.

The present invention includes the following features: automated posting of day-ahead and hour-ahead local and regional pricing; transaction platform that allows bid notification from energy supplier or ISO for voluntary load reduction including time period, total requirement, and price offered; economic value calculation of load curtailment (customer "self-serve"); customer election to participate, including amount of load curtailment and time period; bid acceptance/rejection by supplier/ISO; benchmark load certification; and verification of load curtailment and payment amount.

The present invention provides the following benefits: capitalize on revenue generation opportunities and maximize energy cost savings; optimize contributions to curtailment opportunities by aggregating multiple sites; maximize your load curtailment planning with automated notifications on energy price signals; and manage ongoing analysis of revenue generating opportunities.

CLAIMS:

1. A combination system for providing energy management, comprising:

retriever means for providing information to a user characteristic of energy consumption patterns, and for using the information to develop at least one optimal energy management strategy;

energy analysis means for generating signals to assist the user in implementing a selected energy management strategy, facilitating development of procurement and usage strategies;

power quality means for monitoring facility electrical disturbances and activating alarms when at predetermined number of readings fall outside of industry-specified tolerance specifications;

load management marketplace means for determining volatility of energy supply market and determining management of the energy responsive to the volatility; and

distributed generation dispatch means for supporting dispatch of site generation resources and implementation of load management strategies.

2. A combination system for providing energy management according to claim 1, wherein said retriever means further includes the functionality of: automated energy consumption data retrieval, archiving, and posting; load data posting; load analysis and comparison; and cost estimation based on tariff.

3. A combination system for providing energy management according to claim 1, wherein said energy analysis means further includes the functionality of: load aggregation; peak load analysis with trending and benchmarking; cost estimation including "what-if" analysis; utility bill posting per existing tariff(s); and automated notification with alarming and paging.

4. A combination system for providing energy management according to claim 1, wherein said power quality means further includes the functionality of: data monitoring, event capture, and archiving; web access to power quality information in various formats; access to 24/7 to an Information Command Center; personalized alarm triggering via pager, e-mail, cellular phone, or personal data assistant (PDA); and harmonic analysis.

5. A combination system for providing energy management according to claim 1, wherein said load management marketplace means further includes the functionality of: automatic posting of local and regional pricing; benchmark load certification; verification of load curtailment and payment amount; bid notification and at least one of acceptance and rejection from at least one of a supplier and an ISO; economic value calculation of load curtailment; and customer election to participate in the energy management.

6. A combination system for providing energy management according to claim 1, wherein distributed generation dispatch means further includes the functionality of: automated generator operation or load-shedding initiative; verification of power generated and notification

of curtailable event; viewable data from any combination of energy resource related assets; real-time monitoring and alarming of all asset parameters; and determination of participation level and savings.

7. A combination system for providing energy management, comprising:

retriever means for providing information to a user characteristic of energy consumption patterns, and for using the information to develop at least one optimal energy management strategy, wherein said retriever means further includes the functionality of: automated energy consumption data retrieval, archiving, and posting; load data posting; load analysis and comparison; and cost estimation based on tariff;

energy analysis means for generating signals to assist the user in implementing a selected energy management strategy, facilitating development of procurement and usage strategies, wherein said energy analysis means further includes the functionality of: load aggregation; peak load analysis with trending and benchmarking; cost estimation including "what-if" analysis; utility bill posting per existing tariff(s); and automated notification with alarming and paging;

power quality means for monitoring facility electrical disturbances and activating alarms when at predetermined number of readings fall outside of industry-specified tolerance specifications, wherein said power quality means further includes the functionality of: data monitoring, event capture, and archiving; web access to power quality information in various formats; access to 24/7 to an Information Command Center; personalized alarm triggering via pager, e-mail, cellular phone, or personal data assistant (PDA); and harmonic analysis;

load management marketplace means for determining volatility of energy supply market and determining management of the energy responsive to the volatility, wherein said load management marketplace means further includes the functionality of: automatic posting of local and regional pricing; benchmark load certification; verification of load curtailment and payment amount; bid notification and at least one of acceptance and rejection from at least one of a supplier and an ISO; economic value calculation of load curtailment; and customer election to participate in the energy management; and

distributed generation dispatch means for supporting dispatch of site generation resources and implementation of load management strategies, wherein distributed generation dispatch means further includes the functionality of: automated generator operation or load-shedding initiative; verification of power generated and notification of curtailable event; viewable data from any combination of energy resource related assets; real-time monitoring and alarming of all asset parameters; and determination of participation level and savings.

8. A combination system for providing energy management according to claim 7, further comprising an information command center system for providing energy management comprising:

real-time monitoring and control means for monitoring energy in real-time and for controlling at least one of generation and dispatch of the energy;

Internet-enabled communications means for providing communication between the information command center and at least one of users, energy distributors and energy generators via the Internet;

a plurality of multi-channel, real-time network of sensors for monitoring the energy from at least one of the energy generators and the energy distributors;

real-time pricing means for determining pricing of the energy in substantially real-time;

demand forecasting means for generating an energy demand forecast;

real-time equipment dispatch means for dispatching of site generation resources and implementation of load management strategies;

direct link means for linking to an energy commodity trading desk for at least one of purchasing and selling the energy responsive to the energy management;

load shedding and management means for removing at least a portion of a load responsive to the energy management; and

weather normalization means for determining weather related conditions and potential adverse effects to the energy management.

9. An information command center system for providing energy management, comprising:

real-time monitoring and control means for monitoring energy in real-time and for controlling at least one of generation and dispatch of the energy;

Internet-enabled communications means for providing communication between the information command center and at least one of users, energy distributors and energy generators via the Internet;

a plurality of multi-channel, real-time network of sensors for monitoring the energy from at least one of the energy generators and the energy distributors;

real-time pricing means for determining pricing of the energy in substantially real-time;

demand forecasting means for generating an energy demand forecast;

real-time equipment dispatch means for dispatching of site generation resources and implementation of load management strategies;

direct link means for linking to an energy commodity trading desk for at least one of purchasing and selling the energy responsive to the energy management;

load shedding and management means for removing at least a portion of a load responsive to the energy management; and

weather normalization means for determining weather related conditions and potential adverse effects to the energy management.